Re-Examining Assumptions Concerning Evolutionary Function of Relatively Fast Reaction Times to Peripheral Vision Stimuli Versus Central Vision; Cellular Perseveration as an Exponent of Metabolic Efficiency in the Occipital Lobe

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Simon Edwards
Research Acceleration Initiative

Introduction

Current doctrine holds that peripheral vision reaction times are quicker than those associated with central vision as this improved reaction time may have aided survival in cases where humans have been faced with attacks by predators or other humans. While not unreasonable, there are good reasons to doubt this hypothesis which may shed light on other aspects of neurology whereby biological optics are concerned that are critical for properly understanding visual processing dynamics.

Abstract

Under conditions of metabolic strain, the occipital lobe loses the ability to process information concerning chromatic information (color) before it loses the ability to process luminosity (brightness.) Processing chromatic data is likely a more energy-intensive process carried out by different cells within the occipital lobe which, although physically proximal to the luminosity-processing cells, are functionally and structurally unique. I postulate that a combination of signals from both cell types are relayed from different parts of the occipital lobe to a more centralized area within the lobe that synthesizes brightness and color values as it pertains to specific points in the field of view.

Rarely, a condition of metabolic exhaustion might exist that cause chroma values from a previous point in time (up to half a second) to be imposed upon luminosity values, causing a human to perceive, for instance, a moment after being shown a picture of a green apple that a blue truck is, in fact, green. The processing of chromatic data, being a more energy-intensive process, is one in which cells of the occipital lobe specializing in this function (not unreasonable to suspect since rod and cone organelles evolved separately) take every possible shortcut to reduce cellular energy usage.

One shortcut that these cells would seem to be utilizing is the temporary storage and retransmission of old data in a system not totally dissimilar from the way in which video compression algorithms save space by noting color/luma data that repeats from one frame to the next and writing it only a single time. The big difference here is that each neuron storing chromatic data is, once it has calculated a color value, stores that value for a fraction of a second by acting as an MLC voltage cell in a solid-state drive. In the event that a cell's metabolism is exhausted, old information concerning a color value may be transmitted repeatedly, causing this superposition of old chromatic values over top of new luminosity values. For this to be true, different cell types must be responsible for processing brightness and color data but with

each type being physically collocated with the spatial position within the occipital lobe dictating the part of the field of view being analyzed.

Going back to a publication of mine from a few months ago concerning nerve function and the sense of touch and pain signals, it is also my hypothesis that nerve signals and positional mapping are the result not purely of a one-for-one positional correlation between physical areas of the skin but also the result of a constantly emitted "ping" signal sent out from the brain down nerve fibers of all types. The brain, I submit, determines the distance a signal has travelled by the response time latency. Pain signals are the result of reflected electricity from these "pings" and not autonomously generated electricity from the nerves. While left-side/right-side data is, indeed, differentiated by positional mapping as it is currently understood, information concerning how far "down" on the body a touch or pain signal is coming from is based upon response time. This is what makes it possible for amputees to feel missing limbs.

Building upon that assumption, when an electrical potential is accumulated by rods and cones, that potential must be quantified by these pinging brain signals by measuring response strength relative to from where in the field of view a signal seems to originate. Different rods and cones line the structure of the eye with each sitting on a different part of the curved surface; each part of the surface corresponding to a different pathway to the brain. There is a delay in reaction time not so much because it takes 250ms for a signal to travel the distance from the eyes to the brain but because repeated signals must generate repeated returns that are consistent over that 250ms for potentials to, in turn, accumulate in the occipital lobe and update color and brightness values, for the lobe to process the overall picture, and for the frontal lobe to make a decision to react and send a motor signal to press a button. Taking this complexity into account, it is surprising that humans enjoy such a quick reaction time at all.

It has been known for quite some time that reflexes diminish with age, but the exact reason has not been clearly established. This fact, nonetheless, provides a clue as to what is happening with visual processing. I propose that the bulk of this delay in response to visual stimuli at any age is due to the comparatively slow process of charge accumulation in occipital cells that build up electrical charge.

Why then, are response times so much better when visual information is acquired through the peripheral vision? A common misconception holds that humans are colorblind in the peripheral zones, however, since this is not the case, this cannot be the explanation.

When light's angular momentum brings it to the eye from an off-center angle, upon entering a rod or cone, the light is reflected as between two mirrors in a barbershop and interacts with the interior of the rods and cones more times than it otherwise would before reaching the rear of the organelles. The higher count of interaction events between signalling molecules and photons increases the electrical charge of those molecules and their propensity to give off electrons when "pinged" by the brain's sensing mechanism.

The more electrons are given off by those charge-conveying molecules, the

faster a discernible charge potential will accumulate in the cells of the occipital lobe. This is the true basis of improved peripheral reaction times.

Understanding that color-interpreting cells of the occipital lobe have this energy-conserving mechanism of being able to store and repeatedly transmit signals without updating calculations concerning color has implications for explaining the behavior of other cells in the brain that may be metabolically deficient and exhibiting the repeated and inappropriate sending of signals as in Parkinson's Disease. Just as individual patients with neurological disorders can exhibit behaviors known as "perseverations," these behavioral perseverations may be explicable through the identification and study of cellular-level perseveration.

If we were to conduct an experiment such as the one I mentioned involving the conflation of green and blue, it would be interesting to note if this vaguery of perception is brought on as readily by yellow and blue or orange and violet. Green and blue, given that they are neighbors in terms of frequency, if the cells of the occipital lobe store color data (if briefly) as a separate level of charge corresponding to each color, colors with nearly the same frequency would, hypothetically, be most likely to be misperceived. The level of voltage in a cell or group of cells associated with "green" is very nearly the same as "blue" and while perception of colors of dramatically different frequency would result in a more rapid change in the electrical charge of the cells, colors very near to one another would take longer to result in sufficient accumulation of electricity to generate a change in color perception.

Conclusion

While cellular perseveration is, in this author's view, actually responsible for improving the metabolic efficiency of occipital lobe function in visual processing and is most likely critical for regulation of autonomic functions like cardiac function and respiration, when neurons in other brain regions begin exhibiting this behavior (as in Parkinson's or Tourette's) it may indicate the presence of metabolic strain; an early warning sign for Parkinson's and related conditions.